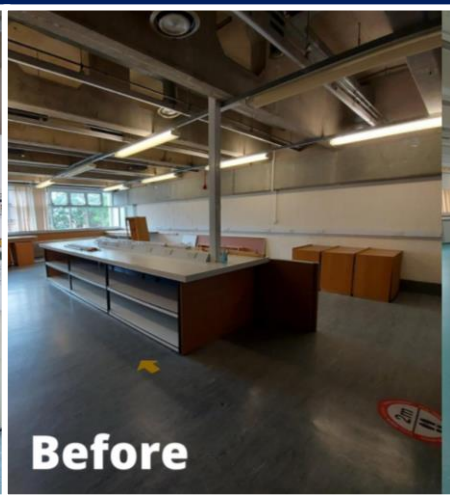
Junior Demonstrator Workshop



Diana Passmore & Kieran Rivers/Wenyu Zhang

(slides adapted from many previous TA's: Brad Young, Laura Wheatley, Mike Goode, Dr Ben Jenkins and Dr Megan Carter, to name a few!)

OxfordMaterials

UNIVERSITY OF OXFORD

Overview

- Undergraduate labs in Materials Science
  - Important people
  - Purpose
  - Schedules
  - Groupings
  - Topics
- The role of the Junior Demonstrator
  - What it is
  - What it isn’t
- Some advice
- Possible UG lab scenarios

The Purpose of UG Labs

- Labs provide essential training in **practical scientific skills**, conducting **work independently** from written instructions to report writing
- Labs support the academic lecture course series throughout the year
- Labs are EXAMINED coursework towards either Preliminary or Final exams

ICE BREAKER

What is your best memory (or worst) of your undergraduate labs?

Undergraduate Degree Structure

Year	Module	Assessment
1	MS1 – Structure of Materials	Written Summer 'Prelims' Exams 400 / 500 marks
	MS2 – Properties of Materials	
	MS3 – Transforming Materials	
	MMES - Maths for Materials and Earth Scientists	
	Practical Labs	**Written assessment of lab reports** **50 / 500 marks**
	Crystallography Classes	Written assessment during classes 50 / 500marks
2	GP1 - Structure and Transformation of Materials	Written Summer 'Finals' Exams at end of 3rd year 400 / 1200 marks
	GP2 - Electronic Properties of Materials	
	GP3 - Mechanical Properties of Materials	
	GP4 - Engineering Applications of Materials	
	Practical Labs	**Written assessment of lab reports** **60 / 1200 marks**
	Industrial Visits, Business Module	Written assessment of reports 40 / 1200 marks
3	OP1 – Materials Options Paper 1	Written Summer 'Finals' Exams at end of 3rd year 200 / 1200 marks
	OP2 – Materials Options Paper 2	
	Team Design Project	Written assessment of reports 50 / 1200 marks
	Characterisation / Modelling Module	Written assessment of reports 50 / 1200 marks
4	Masters (Part II) Project	Written assessment of thesis 400 / 1200 marks

Important People

- **Prof Peter Nellist**– Practical Class Organiser (PCO)


- Diana Passmore/**Daniel DeBrincat** – Practical Class Technician (PCT)/Teaching Lab Technician (TLT)
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- Academic Lead

- Senior Demonstrators (SD's)

- Deputy SD's

- Junior Demonstrators/Teaching Assistants (JD's/TA's)

- The Students (≈38-48 each year)


- Education Support Team
  - Philippa Moss, Tom Heath etc.

UG Labs Schedule

14:00 – 17:00

- First year (2 days):
  - Thursday & Friday (6hrs/wk)
  - Excluding some introductory labs in MT wk1-2
  - Weeks 1-4 TT
- Second year (3 days):
  - Monday – Wednesday (9hrs/wk)
  - Special timetable in TT

Each practical runs in a 2 week block

- Ensure you are available for the whole duration (each afternoon) of the practical
- TA's should aim to arrive at least 10 minutes before the start of labs
- Practical timetable is reviewed annually

UG Lab Groups

- Student's work in groups of **2 – 3**
- Not grouped by college
- Designed to encourage and teach
- Will undoubtedly include a mixture of abilities, personalities, approaches, genders

UG Lab Topics – Year 1

- Practical 1P1a Intro to Computing
- Practical 1P1b Intro to Microscopy
- Practical 1P2 Intro to LabVIEW
- Practical 1P3 Young's Modulus & Stress Analysis
- Practical 1P4 Metallography
- Practical 1P5 Bubble Raft
- Practical 1P6 Thermal Analysis
- Practical 1P7 Electrode Potentials
- Practical 1P8 Polymers - Molecular Weight Effects
- Practical 1P9 Energy Levels and Band Gaps
- Practical 1P10 Fabrication & Tensile Testing

http://www.materials.ox.ac.uk/teaching/ug/ugpracticals.html

UG Lab Topics – Year 2

- Practical 2P1 Materials Selection
- Practical 2P2 Steels
- Practical 2P3 Extrusion
- Practical 2P4 Casting
- Practical 2P5 Mechanical Properties of Polymers
  Practical 2P6 Dislocations and Plasticity
- Practical 2P7 Corrosion
- Practical 2P8 Diffusion
- Practical 2P9 XRD Detective
- Practical 2P10 SEM and Fracture
- Practical 2P11 Transmission Electron Microscopy (TEM)
- Practical 2P12 Semiconductor Devices

http://www.materials.ox.ac.uk/teaching/ug/ugpracticals.html

UG Practical Assessments

- Lab Notebook:
  - completed during the practical hours
  - stay in the lab
  - concise information about what happened in lab
  - assessment type for majority of practicals
  - marked out of 3 (by SD)

- Lab Report:
  - 3 weeks to complete (at home)
  - in the form of an Acta Materialia article
  - usually 1x report per term
  - marked out of 13 (by SD)

- Other:
  - introductory 1st year labs not assessed (1P1a, 1P1b, 1P2)
  - poster presentation (2P1 Material Selection)

ACTIVITY

What makes the best teachers/educators effective?

Think of a couple of examples of good & bad teaching…

APPLICATION

How can one apply certain skills to make them an effective demonstrator?

(In your experience, what makes a good/bad demonstrator?)

The Role of the SD

- To write/update **lab script** for the students to follow
- To introduce and **explain the relevance** of the lab
- To tell the students the **key deliverables** they are looking for
- To instruct the TA's if there are **special themes** they want highlighted by the students
- To be around in the labs to answer **academic questions**, ~ 1 hour per day (not fixed)
- To read and **mark** the lab notebooks/reports

The Role of the JD/TA is... (1)

- To **familiarise** themselves with the practical (practical script, equipment, frequent problems, data analysis)
- (For new JDs) complete **the lab and produce a data set** – paid!
- Assist PCT (Diana/Daniel) to:
  - set up/down each practical
  - encouraging safe, respectful and professional behaviour in the labs
  - concluding the labs in a timely fashion
- To **answer <u>reasonable</u> questions** from students

REASONABLE OR UNREASONABLE?

1. "What should we do first?"	R
2. "How many measurements should we take?"	UR
3. "We are unsure if we have set up our testing equipment properly, please could you check?"	R
1. "Do these results look right to you?"	R
2. "What is the point of this lab?"	R
3. "Can you please do this (part of the experiment) for me while I write in my lab notebook?"	UR
1. "What is the answer for this part of the practical?"	UR
2. "Can I leave early as I have to attend a sports match?"	UR

What should you do if you are asked a question that you don't know the answer to?

The Role of the JD/TA is... (2)

- To assist student in becoming effective experimental scientists with:
  - proper lab discipline, **behaviour** and time management
  - effective **team-work** and communication skills
  - **correct use of lab notebooks** (most examined and available to the examiners for inspection)
- To assist students with experimental **equipment**
- To develop themselves in their **communication and teaching** skills.

Comply with the rules of the lab!

The Role of the JD/TA is not...

- To give students the '**answers**' to the lab
- To do any work for the students or tell the students how to approach the tasks
- To tell them if they've gotten something '**right'** or **'wrong**'
- To earn some quick money by **baby-sitting** a group of young adults / to catch-up on reading

A few words of advice

- Make sure to spend time getting familiar with your practical(s)
  - It is much easier to deal with problems if you understand the practical, apparatus and data analysis!
  - You get paid for the training time!
- Be **proactive** and talk to *all* the groups regularly
  - This often helps to identify problems before they arise
- Enjoy yourself!

Application Process

- Application form + reference from supervisor + Right-to-Work check (HR)

- You will receive:
  - application form
  - job description
  - practical schedules
  - (practical's that are available for selection)

Due Date: ***5pm Friday 6th Dec 2024***

https://www.materials.ox.ac.uk/teaching/pg/pgta.html

LUNCH!

LAB SCENARIOS (1)

- A student doesn’t understand the handout’s instructions
- You see someone copying from another group
- You notice a beaker of acetone on a turned-on hot plate
- A student is in the IT room completing a problem sheet for a deadline
- You see a student about to pick something up out of acid with their fingers
- Several groups in the lab all need help at the same time

LAB SCENARIOS (2)

- One person in a group is doing no work (or all the work)
- A student is playing with a smart-phone in the lab
- A student leaves the lab to go to the café
- You think a group are rushing their work to leave early
- You see a group plotting the wrong graph when analysing their data
- Two students are spraying water at each other with pipettes
- You spot someone polishing without safety specs
- The furnace for one of the groups isn’t working

Real Scenario

You are approaching the end of day two of a three day lab. You have concerns that one group will struggle to finish on time. They have taken multiple measurements for 2 out of 5 samples, but have not yet taken any measurements on the other three samples. They seem more concerned with taking multiple measurements for each sample.

What would you do?